

ARSG Brainstorming Session (4/1/14)

Background on Adits in Upper Cement Creek

Physical Characteristics. We have defined Upper Cement Creek as the area from the headwaters of the creek to the old mining town of Gladstone eight miles upstream of Silverton. Cement Creek lies in the middle of the Silverton Caldera. (See enclosed maps and figures.) There are four draining adits of concern, all located on the same mountain. From lowest elevation to highest, they are the American Tunnel (10,600 ft.), the Red & Bonita (11,000 ft.), the Gold King #7 (11,400 ft.), and the Mogul (11,400 ft.). The American Tunnel is at Gladstone which is accessible in winter except during significant storms via a well-maintained gravel road. The other sites are only accessible in summer and fall by four-wheel drive. Snow depths can be over 25 feet.

The straight-line distances of the top three mines to the American Tunnel are: the Red & Bonita, 0.5 miles; Gold King, 0.7 miles; and Mogul, 1.5 miles. There are large avalanche paths crossing between all of these sites. Below the American Tunnel is a large open area, maybe 40 acres. There are several acres of open, relatively flat area below the Mogul and Red & Bonita. There is no appreciable space around the Gold King. Both the American Tunnel and Mogul have bulkheads, so there is no access to the workings, although there is an open shaft above the Mogul thought to reach the mine pool behind the bulkhead. The Red & Bonita was opened up (perhaps for the first time in a hundred years) by EPA this past summer. The Gold King has a collapsed entrance, but some work was done in the mine in the late 1980's. The portal to the American Tunnel lies on BLM land, whereas the other three sites are privately held.

Water Quality. The combined drainage of the four principle adits is 600+ gpm. Three of these mines have a fairly steady year-round flow. The Gold King drainage fluctuates greatly depending on snowpack, snowmelt and time of year. Attached is an Excel worksheet showing the water quality and approximate flows at each adit.

Cement Creek naturally has high metal concentrations and low pH (3.5 – 4.0) and is not believed to have ever supported aquatic life. Water quality concerns consist mostly of aquatic impacts in the Animas River which Cement Creek joins in Silverton. The metals of highest concern, based upon impacts to the Animas River, are zinc and cadmium, then copper and manganese, and then iron and aluminum. Iron and aluminum concentrations are high in the Animas, but most of the sources are thought to be natural. Most of the manganese issues in the Animas are above its confluence with Cement Creek. Dissolved lead is not especially high in the Animas, and there is very little arsenic, mercury or selenium in the basin.

Water Quality Related Actions in Cement Creek. For thirty years, the American Tunnel served as the main access and drain to the Sunnyside Mine, by far the largest mine in San Juan County. When the mine closed in 1991, a lime precipitation plant at the American Tunnel was treating about 1600 gpm of AMD. As part of Sunnyside's reclamation plan and under a consent decree between Sunnyside Gold and CDPHE, Sunnyside Gold installed around twelve bulkheads throughout the mine and one major bulkhead 8,000 feet back in the American Tunnel. Water backed up in the workings over 1,000 vertical feet. Over an interim period of six years, Sunnyside monitored zinc in the Animas River, treated the residual drainage from the American Tunnel (around 600 gpm, the tunnel was dry for about 2,000 feet from the bulkhead until it hit a wet fracture zone), treated all of Cement Creek at Gladstone during low flow time periods, and remediated many historic mine waste sites around the Upper Animas Basin to offset the water quality impacts of seepage that might be caused by the higher water table in the mine. In 2003, CDPHE agreed with Sunnyside Gold that it had completed its

obligations under the consent decree with the stabilization of the mine pool, and the installation of two more bulkheads in the American Tunnel, downstream of the wet fracture zone in 2002.

Around the time of the termination of the consent decree, it was noticed that flows were increasing in the Mogul, Red & Bonita, and Gold King. The latter two mines had had little to no flow before the consent decree. A bulkhead had been installed in the Mogul in 2002 to reduce its flow, but the ground is too fractured, and 60 gpm finds its way around the bulkhead. Flows from these three mines appeared to have stabilized by 2006. The treatment plant in Gladstone stopped operating in 2004. Currently, during low-flow, zinc, copper and manganese concentrations at the mouth of Cement Creek in Silverton have at least doubled since the beginning of the consent decree (when the treatment plant was operating), and cadmium, iron and aluminum have all substantially increased.

Current Activities. Two years ago, EPA stated that upper Cement Creek could score high enough to be placed on the National Priorities List. A number of people in the local community oppose a CERCLA designation because of fear that it may impact the potential for funding future mining in the area and concern that the local community will lose control over developing an appropriate solution. Sunnyside Gold, acquired by Kinross several years ago, admits no liability but has offered \$6.5 million towards a solution if it can come to a settlement agreement with EPA, and if there is no NPL listing. Potentially, another \$4 million may be available through a trust related to the ASARCO bankruptcy.

The Animas River Stakeholders Group (ARSG), which is made up of environmental groups, mining companies, local, state and federal agencies, and local citizens, is trying to develop a path forward. ARSG operates by consensus, and there is none regarding a CERCLA designation. At this time, a major focus for the group is to find ways to reduce the long-term costs of treating AMD.

EPA and BLM are continuing to collect data to better characterize the impacts of the water quality. EPA opened up the Red & Bonita last summer and is proposing a future bulkhead along with plumbing to potentially treat the mine pool it will form. The bulkhead will have a pipe and valve, so if there are unintended consequences such as backing water out of other portals, the pool can be drained. Other people have proposed removing the two bulkheads closest to the surface in the American Tunnel to reduce the flow from the Red & Bonita and Gold King and thereby collect much of the drainage at the American Tunnel.

Other Activities in the Animas Basin. Over the past twenty year, ARSG and its partners have worked to improve water quality in the Animas River Basin. Approximately 200 piles of mine waste and 180 draining adits have been sampled and prioritized for potential remediation. Initially, thirty three piles and thirty two adits were identified as priority sites. Remediation of those sites formed the basis of site specific water quality standards recommended by ARSG to the Water Quality Control Commission through a Use Attainability Analysis in 2001. Those standards were adopted.

Most remediation of the mine waste piles has been completed, but only six adits have been addressed, mostly with bulkheads and infiltration controls, because of Clean Water Act liability issues. (ARSG has twice had its own Good Samaritan legislation introduced in Congress which would apply to the Animas Basin as a pilot site.) At this time, almost 60 remediation projects have been completed in the Basin. Some of the sites were done before ARSG's basin characterization and in some cases, there were multiple projects at the same site. Large improvements in water quality in Mineral Creek and small improvements in the Animas above Cement Creek have been documented. Unfortunately, drainage from the four Cement Creek adits have overwhelmed all the other improvements, and water quality and aquatic life have diminished in the Animas River downstream of Silverton.